

Serial No.: 09/680,726
Avago Docket No.: 10004229-1
PATENT

REMARKS

The applicants have received and reviewed the final Office Action mailed December 12, 2005. The applicants originally submitted claims 1-32 in this application. By a previous Response and Amendment filed March 19, 2004, the applicants amended claims 3, 12, 15, 28 and 30-32, and cancelled claims 1 and 2. By a previous Response and Amendment filed November 8, 2004, the applicants amended claims 3, 28 and 30-32, but did not cancel any claims. By the present Response and Amendment, the applicants have amended claims 3, 6, 10, 23 and 30-32, but have not canceled any claims. Thus, claims 3-32 remain pending in this application.

The applicants respectfully submit that proper support exists in the specification for the claim amendments and that no new matter has been added. Also, the applicants respectfully submit that entry of the amendments is proper. The amendments raise no new issues requiring further search or consideration. Also, the applicants respectfully submit that the amendments put the claims in condition for allowance. Accordingly, the applicants respectfully request entry of the amendments.

The Examiner rejected claims 3-27 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicants regard as the invention. More specifically, the Examiner indicated that the phrase "between heights x and z" in claim 3 is unclear. Also, the Examiner indicated that there is insufficient antecedent basis for "the refractive index" in line 11 of claim 3. Also, claims 4-27 are rejected based on their dependency from claim 3.

In response to the rejection, the applicants have removed the language "between heights x and z" from claim 3. Also, the applicants have amended claim 3 to properly introduce "the refractive index," thus removing any lack of antecedent basis. In view of the amendments, the applicants respectfully submit that claim 3 is not indefinite. Accordingly, the applicants respectfully request that the Examiner withdraw the rejection of claims 3-27 under 35 U.S.C. §112, second paragraph.

The applicants have amended claims 10, 23 and 30-32 to correct typographical errors therein. The applicants respectfully submit that the applicants have not introduced any new matter.

Serial No.: 09/680,726
Avago Docket No.: 10004229-1
PATENT

The Examiner rejected claims 3-32 under 35 U.S.C. §102(b) as being anticipated by Peake et al. (U.S. Patent No. 6,728,289 B1). The applicants respectfully traverse the rejection in view of the amended claims submitted hereinabove and the remarks provided hereinbelow.

The applicants have amended the claims to clarify existing distinctions between the applicants' invention and the cited art, including the Peake et al. reference. More specifically, the applicants have amended claim 3 to recite a texturing layer within the device structure. The applicants have amended claim 6 in response to the amendment to claim 3. The applicants note that independent claims 28, 30, 31 and 32 already include language directed to textured surfaces. Support for the amendments is found in the applicants' specification, e.g., at page 8, lines 9-19 and in FIGs. 1A-1C.

In the applicants' invention, the texturing layer and/or surfaces create lateral variation of the light emission properties across the aperture of the VCSEL. The variation in the light emission properties spatially enables certain higher order optical modes, whose lobes of high optical intensity correspond to the spatial texturing. Because only a select number of higher order modes have sufficient overlap with the spatial texturing, the applicants' VCSEL emits several of these select higher order modes, which are fixed spatially and relatively stable with respect to the drive current of the device. The spatial definition provided by the texturing prevents mode hopping, thus allowing the VCSEL to transition between high and low data states with reduced deleterious effects caused by coupling efficiency variation and noise.

The applicants respectfully submit that nothing in the Peake et al. reference discloses or suggests textured layers, nor the benefits thereof. The Peake et al. reference discloses a microlens, including VCSELs with an integrated microlens, as shown in FIGs. 17-20. The VCSELs in the Peake et al. reference have non-planar surfaces, but such non-planar surfaces are not textured, as in the applicants' VCSELs. The non-planar layers and structures in Peake et al. are either convex layers or concave layers in the VCSELs shown in FIGs. 18-20: FIGs. 18 and 20 show convex layers, and FIG. 19 shows concave layers. Also, e.g., see Peake et al. from col. 8, line 13 to col. 9, line 29, which describes the formation of the convex and concave layers. The convex and concave layers in Peake et

Serial No.: 09/680,726
Avago Docket No.: 10004229-1
PATENT

al. are not textured layers. Nothing in the Peake et al. reference discloses or suggests textured layers, e.g., the textured layers shown in FIGs. 1A-1C in the applicants' specification, nor the advantages of using textured layers to enable higher order modes in a manner that improves VCSEL operation in terms of improved efficiency and reduced loss due to noise. Therefore, the applicants respectfully submit that claims 3-32, as amended, are neither anticipated by nor obvious in view of the Peake et al. reference.

Moreover, as discussed in the previous response, nothing in the Peake et al. reference discloses or suggests enabling higher order modes, e.g., as recited in the applicants' claims 3-32. The language in the Peake et al. reference cited by the Examiner to supposedly teach the enablement of higher order modes (col. 8, lines 50-53) does not suggest the use of higher order modes. Rather, the Peake et al. reference, including the cited language, teaches of using the fundamental mode and of the reduction of higher order modes in their VCSELs. In fact, the cited language specifically recites that the disclosed VCSEL "enhances" the fundamental mode operation due to increased cavity losses of the higher order spatial modes. Thus, clearly, the Peake et al. reference teaches away from the use or enablement of higher order modes in the VCSEL. In the previous amendment, independent claims 3, 28 and 30-32 were amended to recite that higher order modes are enabled.

Accordingly, in view of these remarks and the claim amendments, the applicants respectfully submit that the Peake et al. reference does not disclose or suggest the applicant's invention as recited in the claims 3-32. Therefore, the applicants respectfully request that the Examiner withdraw the rejection of claims 3-32 in view of the Peake et al. reference.

Serial No.: 09/680,726
Avago Docket No.: 10004229-1
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CONCLUSION

In view of the amendments submitted herein and the above comments, the applicants respectfully submit that the application is in full condition for allowance. Accordingly, the Applicant earnestly solicits early and favorable action. Should there be any further questions or reservations, the Examiner is urged to telephone the Applicants' undersigned attorney at (770) 984-2300.

Respectfully submitted,



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